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**APPLICATION NOTE NO. 48**

**Revised December 2013**

**Entering Calibration Coefficients for the Seapoint Turbidity Meter**

The Seapoint Turbidity Meter measures turbidity by detecting scattered light from suspended particles in the water using dual 880 nm light sources and dual silicon photodiode detectors with visible light blocking filters. The design of the optical sensors confines the sensing volume to within 5 centimeters of the sensor windows.

Sensitivity of the Seapoint Turbidity Meter is determined by two control lines that allow the user to change the range and resolution as required for a particular application. Jumper cables may be purchased from Sea-Bird to allow the sensor range to be changed by inserting the jumper cable in line with the original purchased cable. For a standard Seapoint Turbidity Meter, the following table shows the relationship between cable gain, output sensitivity, and output range.

Cable Gain Setting	Sensitivity (mV/FTU)	Range (FTU)
100X	200	25
20X	40	125
5X	10	500
1X	2	750

In our Seasoft V2 suite of programs, edit the CTD configuration (.con or .xmlcon) file using the Configure Inputs menu in Seasave V7 (real-time data acquisition software) or the Configure menu in SBE Data Processing (data processing software). Select *OBS/Nephelometers/Turbidity – Turbidity Meter, Seapoint* as a voltage sensor when editing the configuration file; the software prompts for the gain setting and scale factor. Seasoft calculates turbidity as:

$$\text{Output (FTU)} = (500 * \text{Scale Factor} * \text{Voltage}) / \text{Cable Gain Setting}$$

where

- Cable Gain Setting is as described above.
- Scale Factor is nominally 1.0 for a standard Seapoint Turbidity Meter, but can be used to adjust the calibration. When greater accuracy is desired, calibrate the sensor prior to deployment using a sample from the measurement site. When the sensor is calibrated using a suspended particle sample, modify the *Scale Factor* to correct any discrepancies in the equation. Factors such as fouling or scratches reduce the sensitivity of the sensor. See Seapoint’s operating manual for maintenance and calibration procedures.

**Notes:**

1. Response to turbidity levels greater than 750 FTU is non-linear. The linear values calculated by our software will be incorrect for water samples with turbidity levels greater than 750 FTU. An approximate response can be calculated using the second-order polynomial equation:

$$\text{Voltage} = 2.2 \times 10^{-3} (\text{FTU}) - 3.0 \times 10^{-7} (\text{FTU}^2)$$

2. Seapoint can provide a turbidity meter with custom sensitivity (consult Seapoint). Seasoft does not have an entry for a custom sensor sensitivity, so you must adjust the Scale Factor to get the correct output. For example, if using a 100x gain cable and a sensor with custom 5x sensitivity, the resulting sensitivity is  $5 * 200 \text{ mV/FTU} = 1000 \text{ mV/FTU}$ , and the output range is 5 FTU. Using Seasoft’s algorithm (shown above) and solving for Scale Factor:

$$\text{Scale Factor} = \text{Output (FTU)} * \text{Cable Gain Setting} / 500 * \text{Voltage}$$

$$= 5 * 100 / 500 * 5 = 0.2 \text{ (enter this value in the dialog box to get the correct FTU output for the custom 5x sensor)}$$

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## Application Note Revision History

<b>Date</b>	<b>Description</b>
March 1996	Initial release.
September 2001	Incorporate Sea-Bird Windows software.
June 2006	Provide more details on using software.
May 2007	Incorporate Seasave V7.
February 2010	<ul style="list-style-type: none"><li>• Change range from &lt; 750 to 750.</li><li>• Update Seasoft-Win32 to Seasoft V2.</li><li>• Add information on .xmlcon configuration file.</li><li>• Update Sea-Bird address.</li></ul>
August 2010	SBE Data Processing and Seasave 7.20g software revision: <i>OBS/Nephelometer</i> sensor listing in software changed to <i>OBS/Nephelometer/Turbidity</i> .
December 2013	Add information on adjusting Scale Factor in Seasoft for sensor with custom sensitivity range.